Venturers at an outlay of about 50,000*l.*, which is covered by insurance, but not the least heavy loss sustained is that of books and manuscripts in the library of the principal, Prof. Wertheimer.

AT the distribution of prizes awarded to successful students of the Royal College of Science, for the session 1905-6, on October 4, Prof. W. A. Tilden, who presided, remarked that two public events of great importance to the college have occurred since the prize distribution last year. The first is the publication of the final report of the departmental committee appointed to study the condition, appliances, purposes, and work of the Royal College of Science and the Royal School of Mines, and to consider what could best be done with them. The committee well described the main object of the institution to be the teaching of science, especially in its application to industry. The other event is the practical completion of the great museum buildings, which have been in progress for seven or eight years. Dr. T. E. Thorpe, who presented the prizes, in an address to the students said those whose business it is to examine students recognised that the system of examinations, like all human institutions, is liable to fall into error. Nevertheless, it is the conviction of those who have given dispassionate consideration to the matter that, faulty and fallible as the system may be, it affords the best method of arriving at the relative positions of schools and students. As a rule, in England a university takes only its name from the place in which it is situated. What has made the Aberdeen University an integral part of the life of the people is that the people make special efforts to create and maintain it, and their self-sacrifice on its behalf gives them an abiding interest in it. It is an unfortunate thing for education in London that London is so vast it is impossible to get collective effort and collective influence enlisted for any of its educational institutions.

A SERIES of articles on public-school education was commenced in the *Times* of September 10, and among the subjects which have been dealt with in the eight contributions which have been published already are mathematics, science, and engineering. Mr. T. J. Garstang, in his article on the teaching of mathematics (September 13), traces the course of development which has led to the adoption of reformed courses of geometry, arithmetic, and algebra in our schools. Much, however, remains still to be accomplished. As Mr. Garstang points out, the commercial arithmetic still exacted through examinations is largely either a survival of past commercial method or a collection of artificial fictions. Mr. W. D. Eggar, writing on science in public schools (September 20), considers what school science is now compared with what it was thirty years ago. Thanks largely to Prof. Armstrong's efforts, science teaching by lectures or talks illustrated by curious experiments has given place to practical work, by which pupils measure and weigh and accumulate experience by and for themselves. If nature-study forms part of the English teaching in schools, and practical measurement part of the mathematical work, Mr. Eggar thinks it is possible in one stage of every boy's career to give him a real chance of learning scientific method. In some middle portion of the school through which all boys must pass, a year's course with four hours a week should be mapped out. To this work the main energies of the laboratory staff must be directed, and the classes must be small. The most suitable subjects Mr. Eggar believes to be heat or chemistry or magnetism and current electricity. The subject should be one in which mathematical theory may be kept in the background until a thorough practical acquaintance with facts has been gained; also one which gives ample scope for cultivating the scientific virtues of accuracy and honesty. The Rev. F. Stephenson describes (October 9) what is done by a public school to train boys who intend to become engineers. In his concluding paragraph he remarks:—"The public school caters mostly for those whose means and brains alike are limited, and attempts to combine the teaching of the science of engineering in the class-room with practice in the workshops in such a way that at eighteen a boy may be ready to take full advantage of the opportunities offered him in large commercial works, and may neither waste six months in picking up as best he may from mechanics the purport of nuts, valves, and cylinders, nor allow himself to sink in manners and morals to lower standards that may not unnaturally be prevalent among associates of a humbler class."

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 28.—"An Investigation of the Influence of Electric Fields on Spectral Lines." Preliminary Note. By Prof. G. F. **Hull**. Communicated by Prof. J. Larmor, Sec.R.S.

In general the electrical fields used were those concomitant with the luminous electric discharge. An interferometer of the Michelson form and an echelon spectroscope of eighteen plates were used to analyse the radiations. The results may be summarised as follows:—

(1) End-on discharge tubes of special design in which the light-source was a uniform column of luminous mercury vapour, viewed in the direction of discharge, showed no change of wave-length so great as 1 part in 4,000,000 when the direction of the discharge was reversed. The pressure in the tube was varied from a few millimetres to a vacuum so high that there was but little luminosity.

(2) The passage of Röntgen rays through the tube did not alter the wave-length nor the width of the mercury lines to an extent sufficient to affect the visibility of interference fringes formed with a difference of path of 400,000 waves. When the luminous column was viewed at right angles to the direction of the discharge no polarisation effects in the radiation from it, due to the passage of the Röntgen rays, could be detected by a sensitive Savart plate and Nicol prism.

(3) When the discharge passed in air between electrodes formed of an amalgam of cadmium and mercury, no variation of the wave-lengths of the strong Cd, Hg, lines greater than 0·002 tenth-metre was obtained by changing the line of sight from a direction along the discharge to one at right angles to that direction. Approximately the same result held good when a small capacity was inserted in the circuit, but in this case the discrepancies in the readings were larger.

This result shows that the luminous particles do not acquire a velocity in the direction of the discharge greater than 150 metres per second. Hence the curving of the image of the discharge produced by a rotating mirror, as in the Feddersen experiment, and as recently studied by Schuster and Hemsalech for individual spectral lines, appears to be due, not so much to motion of luminous particles as to the propagation along those particles of a condition of luminosity.

(4) Doppler effects in the canal rays, as announced by Stark during the course of the present investigations, were found for the strong hydrogen lines. In some cases they appeared also in mercury lines. The velocities represented by the displacements of the lines were of the order of 4×10^5 metres per second for the hydrogen particles and $2{\cdot}5 \times 10^4$ metres per second for those of mercury. But it was found that, in general, the luminous mercury particles in the canal rays did not move (with a velocity greater than 100 metres per second). In these cases the canal rays appear to be due to non-luminous particles streaming through the mercury vapour and producing luminescence in the latter, probably by bombardment.

(5) A glass tube was sealed on to a canal-ray tube at right angles to the direction of the rays. This tube was covered by a piece of optical glass as free as possible from strain. A very sensitive combination of Savart plate and Nicol prism was used to detect, if possible, any polarisation that might exist in the light from the rays in hydrogen. After eliminating reflections from the walls of the tube no polarisation could be recognised.

(6) The light produced by electrical discharge, in uniform tubes 3 cm. or 4 cm. in diameter, was examined at right angles to the direction of discharge, at various points between the electrodes, and also behind the perforated kathode. It was found that the principal hydrogen lines were greatly broadened in those parts where the electric

field is known to be of great intensity. For example, the luminous layer covering the kathode (the dark space being 0·5 cm. to 4 cm.) gave hydrogen lines 0·4 Ångström unit in width, but the lines of the second hydrogen spectrum and certain air lines were not appreciably broadened. This broadening seems to be due mainly to motion of the particles rather than change of free periods, for it is found to the same extent behind the kathode in the canal rays. The broadening is so great that it is not possible with the instruments at the author's disposal to determine the shift of these lines except to fix a superior limit of 0·1 Ångström unit to its possible magnitude. The amount is probably considerably less than this. On the other hand, the shift of the lines of the second spectrum of hydrogen is so small as to approach the limits of error, viz. 0·005 Ångström unit. The mercury lines show no shift but a slight broadening.

The experiments thus show that any electrical analogue of the Zeeman effect is, under the above conditions, largely masked by a widening of the lines.

"The Alcoholic Ferment of Yeast-juice. Part II.—The Coferment of Yeast-juice." By Dr. A. **Harden** and W. J. **Young.**

Summary.—I.—(1) Photolytic decomposition of aqueous carbon dioxide can take place in the presence of chlorophyll, independently of vital or enzymic activity, provided that the necessary physical and chemical conditions are strictly adhered to.

(2) The products of the decomposition are formaldehyde and hydrogen peroxide, formic acid being an intermediate product.

(3) It is possible to reconstruct the process of photosynthesis outside the green plant, (*a*) as far as the production of formaldehyde and oxygen, by introducing a suitable catalysing enzyme into the system, and (*b*) as far as the production of oxygen and starch, by introducing, in addition to the enzyme, certain kinds of non-chlorophyllous living protoplasm.

II.—(1) There is direct experimental proof that formic acid is a product of the photolytic decomposition of carbon dioxide in the presence of an inorganic uranium salt.

(2) Formaldehyde has not been isolated and identified, in the case of an inorganic uranium salt, but a study of the reactions involved favours the view that it is formed as a transitory intermediate product.

MANCHESTER.

Literary and Philosophical Society, October 2.—Dr. W. E. Hoyle in the chair.—An account of *Eucommia ulmoides*, a Chinese tree yielding gutta-percha: Prof. F. E. **Weiss.** The author exhibited a young specimen of the tree, and mentioned that he had two larger ones growing in the open in his garden at Withington. The special interest in this tree lies in the fact that it is the only known plant yielding gutta-percha which can be grown outside the tropics.—A preliminary account of the life-history of the common house-fly (*Musca domestica*, L.): C. Gordon **Hewitt.** The female fly lays her eggs in the crevices of horse excrement, which for this purpose must be fresh. Despite the difficulty met with in getting the flies to lay their eggs in confinement, five lots of larvæ were reared, each batch experiencing different conditions of temperature. A rise in temperature produced an acceleration of the rate of development at any stage. In the larval state three stages are recognisable. The shortest period for the egg state was twenty-four hours, and remained constant. Those for the larval stages were two, two, and four days respectively, whilst that of the pupal state was six days. If these times be taken, the whole period from the deposition of the egg to the exclusion of the imago would last about fifteen days. In the actual experiments the total period varied from twenty to thirty days.

DIARY OF SOCIETIES.

WEDNESDAY, OCTOBER 17.

ROYAL MICROSCOPICAL SOCIETY, at 8.—Some Rotifera of the Sikkim Himalaya: J. Murray.—*Cornuvia serpula*; a Species of Mycetozoa new to Britain: J. M. Coon.

ENTOMOLOGICAL SOCIETY, at 8.

THURSDAY, OCTOBER 18.

CHEMICAL SOCIETY, at 8.30.—Presentation of the Longstaff Medal to Prof. W. Noel Hartley.—The Amino-dicarboxylic Acid derived from Pinene: W. A. Tilden and D. F. Blyther.—The Preparation and Properties of Dihydropinylamine (Pinocamphylamine): W. A. Tilden and F. G. Shepheard.—Determination of Nitrates: F. S. Sinnatt.—The Nature of Ammoniacal Copper Solutions: H. N. Dawson.—Malacone, a Silicate of Zirconium containing Argon and Helium: S. Kitchen and W. G. Winterson.—The Relationship of Colour and Fluorescence to Constitution, Part i., The Condensation Products of Mellitic and Pyromellitic Acids with Resorcinol: O. Silberrad.—The Colouring Matters of the Stilbene Group, Part iii.: A. G. Green and P. F. Crosland.—(1) Separation of αα- and ββ'-Dimethyladipic Acids; (2) Action of Alcoholic Potassium Hydroxide on 3-Bromo-1 : 1-Dimethyl-hexahydrobenzene: A. W. Crossley and N. Renouf.—(1) The Compounds of Pyridine with Dichromates; (2) The Normal Chromates and the Unsaturated Character of the Chromate Radical: S. H. C. Briggs.—(1) Interaction of Succinic Acid and Potassium Dichromate, Note on a Black Modification of Chromium Sesquioxide; (2) Derivatives of Polyvalent Iodine; the Action of Chlorine on Organic Iodo-derivatives, including the Sulphonium and Tetra-substituted Ammonium Iodides: E. A. Werner.—(1) New Derivatives of Diphenol (4-4'-Dihydroxydiphenyl); (2) The so-called "Benzidine Chromate" and Allied Substances: J. Moir.—The Interaction of the Alkyl Sulphates with the Nitrites of the Alkali Metals and Metals of the Alkaline Earths: P. C. Rây and P. Neogi.

INSTITUTION OF MINING AND METALLURGY, at 8.—The Auriferous Rocks of India, Western Australia, and South Africa; M. Maclaren.—Sand Sampling in Cyanide Works: D. Simpson.—Treatment of the Precipitate and Manipulation of the Tilting Furnaces at the Redjang-Lebong Mine, Sumatra: S. J. Truscott.—A Combined Air and Water Spray: T. White.

FRIDAY, OCTOBER 19.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—*Discussion:* Railway-motor-car Traffic: T. H. Riches and S. B. Haslam.—*Paper:* Some Notes on the Mechanical Equipment of Collieries: E. M. Hann.

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SUPPLEMENT.